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Lander, orbiter under study for Mars '03



Artist's drawing of the Mars Mobile Lander, one of two concepts being considered for a 2003 launch. The Mars Surveyor Orbiter is also being studied.

In 2003, NASA may launch either a Mars scientific orbiter mission or a large scientific rover that will land using an airbag cocoon, like that used on JPL's 1997 Mars Pathfinder mission. The two concepts were selected from dozens of options that had been under study. NASA will make a decision on the options, including whether or not to proceed to launch, in early July.

Dr. Firouz Naderi, manager of the Mars Program Office at JPL, said two "fast-track" Phase A studies are underway. David Lehman is leading a review for the orbiter concept, which is expected to be completed July 6 or 7. The lander concept study, led by Peter Theisinger, is expected to be completed July 10 or 11.

In the studies, the teams also will evaluate risk, cost, and readiness for flight, allowing 36 months of development leading

to a May 2003 launch date.

Reports will be submitted for review to Mars Program Director Scott Hubbard at NASA Headquarters. Dr. Ed Weiler, NASA's associate administrator for space science, will make the final decision of which mission—if any—to launch in the 2003 opportunity. If selected, the cost of the 2003 mission will be about the same as the Pathfinder mission (adjusted for inflation).

Naderi said that if the orbiter concept is selected, it would be developed by Lockheed Martin Astronautics in Denver. Should the lander be selected for the 2003 launch opportunity, JPL would develop it.

Naderi said he hopes for a decision by July 14 or shortly thereafter. "We believe both mission concepts are doable," he noted, adding that it is unlikely that neither concept will be selected.

"Our budget will support only one of these two outstanding missions, and it will be a very tough decision to make," Weiler said.

The Mars Surveyor Orbiter is a multi-instrument spacecraft similar in size to the currently operating Mars Global Surveyor. It is designed to recapture all the lost science capability of the Mars Climate Orbiter mission as well as to seek new evidence of water-related materials. The orbiter's mission will be to study the Martian atmosphere and trace the signs of ancient and modern water. Its instruments potentially will include a very high-resolution imaging system, a moderate-to-wide-angle multicolor camera, an atmospheric infrared sounder, a visible-to-near-infrared imaging spectrometer, an ultraviolet spectrometer, and possibly a magnetometer and laser altimeter. Telecommunications relay equipment that could be used to support Mars missions for 10 years also would be included.

The rover is based on the Athena rover design, which already has been operated in field tests and previously was considered for the canceled 2001 lander mission. The concept being proposed for the 2003 mission involves packaging the 130-kilogram (286-pound) rover in a system similar to the 1997 Mars Pathfinder structure, which would be cushioned on landing by airbags. Unlike the 1997 mission, however, the four-petal, self-righting enclosure would serve only as a means to deliver the rover to the surface and not function as a science or support station.

After landing, the Mars Mobile Lander would serve as a self-contained mission, communicating directly with Earth or with an orbiting spacecraft band as the rover traverses the Martian terrain. The rover would be capable of traveling up to 100 meters (109 yards) a day, providing unprecedented measurements of the mineralogy and geochemistry of the Martian surface, particularly of rocks, using a newly developed suite of instruments optimized to search for clues about ancient water on Mars. The mobile surface-laboratory will be able to gain access to a broad diversity of rocks and fine-scale materials for the first time on the surface of Mars, in its search for evidence of water-related materials. The rover's mission would last for at least 30 days on the surface.



Galileo acquired the images in this mosaic of Hi-iaka Patera (the irregularly shaped, dark depression at the center of the image) and two nearby mountains on Nov. 25, 1999.

Galileo finds colorful surprises at Io

Detailed analysis of Jupiter's moon Io reveals a colorful, active world full of surprises, according to five reports published in the May 19 issue of Science, and based on new results from JPL's Galileo spacecraft and the Hubble Space Telescope.

The reports describe giant, erupting plumes migrating with lava flows, red and green deposits that change as unstable sulfur compounds condense from huge

plumes, and mountains that may split and slide sideways for hundreds of kilometers, or miles.

Galileo observations of Prometheus reveal a volcanic field similar to Hawaii's volcanoes, but more active and much larger. Prometheus features an 80-kilometer-tall (50-mile) plume of gas and particles erupting from near the end of the lava flows, like where Hawaiian flows enter the ocean. This is Io's most consistently active plume. Its size and shape have remained constant since at least 1979, but the plume location wandered about 85 kilometers (53 miles) to the west between 1979 and 1996.

"The main vent of the volcano didn't move, but the plume did," said Dr. Rosaly Lopes-Gautier of JPL, lead author of one of the reports.

"This type of behavior has never been seen on Earth," said Dr. Susan Kieffer of Kieffer Science Consulting, Inc., Ontario, Canada, lead author of a Science report. Kieffer and her colleagues suggest that the Prometheus plume is fed when a "snowfield" of sulfur dioxide and/or sulfur vaporizes under the lava flow and material erupts through a rootless conduit in the flow.

By combining Galileo and Hubble Space Telescope results, scien-

tists have learned more about the role of sulfur in Io's volcanoes. While Galileo carried out the first of three recent Io flybys in October 1999, Hubble scanned Io with its ultraviolet spectrograph to measure the composition of gases escaping from volcanoes. Hubble detected a surprise—a 350-kilometer-high (220-mile) cloud of gaseous sulfur in the plume ejected by the volcano Pele. The sulfur gas is a specific type, with sulfur atoms joined in pairs, that had never before been seen on Io; it is stable only at the very high temperatures found in the throats of Io's volcanoes.

Stone to retire next year



Dr. Edward Stone

Dr. Edward Stone, who has served as director of JPL since 1991, last week announced his intention to retire from the Laboratory sometime next year.

Caltech President Dr. David Baltimore has convened a committee to search for Stone's successor.

Stone, who will turn 65 next January, told JPL staff in a memo that his stepping down was "in keeping with the long-standing tradition of directors doing so during their 65th year."

Concurrent to Stone's retirement from JPL, he will also leave his position as Caltech vice president. He plans to returning to full-time teaching and research in Caltech's Physics, Mathematics and Astronomy Division.

During Stone's tenure, Baltimore said, the director "has faced an incredible array of diffi-

cult challenges. In his typically effective manner, Ed took on these formidable tasks and successfully shepherded JPL through an era of tremendous change."

"I hope to appoint a new JPL director early enough to ensure a smooth transition of leadership and continued, effective operation of the Laboratory," Baltimore added.

"I want you to know that I will be fully engaged here at the Lab in the months ahead," Stone told employees. "There is exciting work before us all, and I look forward to those challenges with continuing enthusiasm."

Search committee members are: Admiral Bobby Inman, private investor (chair); Dr. Fred Culick, Caltech professor of mechanical engineering and professor of jet propulsion; Dr. William Jenkins, Caltech vice president for

business and finance; Kent Kresa, chairman, president and chief executive officer, Northrop Grumman Corp.; Dr. John Ledyard, Caltech professor of economics and social sciences; Dr. Ruben Mettler, retired chairman and CEO, TRW Inc.; Dr. Anneila Sargent, Caltech professor of astronomy and director of Owens Valley Radio; Dr. Rochus Vogt, Caltech professor of physics; Dr. William Weber, JPL director of engineering and science; Dr. Albert Wheelon, member of the Caltech Board of Trustees; Gayle Wilson, nonprofit consultant; Thomas Schmitt, Caltech assistant vice president for human resources; and Mary Webster, executive assistant to the president and secretary, Board of Trustees.

In addition to Wheelon, other committee members from the Caltech Board of Trustees are Inman, Kresa, Mettler and Wilson.

News Briefs

MISR images Los Alamos fire

The fire that has raged out of control this month near Los Alamos, N.M., was captured May 9 in a series of images by the JPL-managed Multi-angle Imaging Spectro-Radiometer (MISR) on NASA's Terra satellite.

The true-color images covering north-central New Mexico capture the bluish-white smoke plume of the Los Alamos fire, just west of the Rio Grande river. The middle image is a downward-looking or "nadir" view taken by MISR. As the satellite flew from north to south, the instrument viewed the scene from nine different angles. The top image was taken by the MISR camera looking 60 degrees forward along its orbit, whereas the bottom image looks 60 degrees aft.



Fires in Los Alamos, N.M. as imaged by MISR.

The fire plume stands out more dramatically in the steep-angle views.

MISR scientists use these angle-to-angle differences to monitor particulate pollution and to identify different types of haze. Such observations allow scientists to study how airborne particles interact with sunlight, a measure of their impact on Earth's climate system. The images are about 400 kilometers (250 miles) wide.

The images are available at <http://www.jpl.nasa.gov/pictures/misr>.

Acquisition Division manager named

STANLEY JANKOWSKI has been appointed manager of the Acquisition Division.



Stanley Jankowski

Jankowski, who has more than 20 years of experience in operations and supply chain management in support of space, defense, and commercial programs, joins JPL from Raytheon Corporation's Electronic Systems Segment, where he served as operations director, managing key procurement, material, and logistics functions.

Jankowski also was a member of the Lean Aerospace Initiative, a consortium of 40 companies affiliated with the Massachusetts Institute of Technology, whose goal is to identify and promote best practices within the aerospace industry and its suppliers.

In his new position, Jankowski will have responsibility for the Laboratory's purchasing, subcontracting and acquisition services.

Halpern honored by Headquarters

DR. DAVID HALPERN, a senior research scientist in Research Element 3237 and manager of the Climate Variability Program (7312), recently received a NASA Special Service Award for initiative and superb accomplishments during the International Year of the Ocean.

Halpern, who has worked at JPL since 1986, received the award at NASA Headquarters from Dr. Ghassem Asrar, associate administrator for Earth Science.



David Halpern

Dumas named Patriot of the Year

JPL Deputy Director LARRY DUMAS was earlier this month named Patriot of the Year by the Pasadena Chamber of Commerce.

The award honors a local citizen for

their contribution to maintaining the spirit of patriotism in the community.

Dumas received the award during ceremonies at von Kármán Auditorium that also recognized outstanding achievements of junior cadets from the Reserve Officer Training Corps (ROTC) at Blair, Muir and Pasadena High Schools.

Summer employee/teacher honored

Christine S. Ruiz Aguilera, a JPL summer employee and mathematics and computer science instructor at Moorpark College, has been named Most Distinguished Faculty Chair for the 1999-2000 academic year.

Members of the college's academic senate selected Aguilera in recognition of her teaching skills and organization of a campus program designed to encourage female students to major in math and the sciences. In addition, the committee honored her for the work she has done on space exploration at JPL. For the past 10 years during her summer breaks, Aguilera has helped develop software tools for NASA's Mission Control and the Mars Global Surveyor teams.

Aguilera, who has taught for the past 28 years, is the first woman to hold the post.

Huge Mars photo archive available

More than 20,000 images of Mars taken by JPL's Mars Global Surveyor spacecraft are now available in a Web-based photo album—the single largest one-time release of images for any planet in the history of solar system exploration.

The archive of images covers one Mars year (687 Earth days), beginning in September 1997 with pictures taken during the aerobraking phase and extending through August 1999. Many of the pictures have such high resolution that objects on the surface the size of a school bus can be seen.

The archive can be found at http://www.msss.com/moc_gallery. A subset of the images can be seen at <http://photojournal/cgi-bin/PIADBSearch.pl?NewReleases>.

Board finds cause of HESSI mishap

The High Energy Solar Spectroscopic Imager (HESSI) spacecraft was damaged March 21 during pre-flight vibration tests because of a malfunction in the vibration test system at JPL, according to a NASA review board.

The damage was caused when the test device, called a "shaker," delivered approximately 20 G's, 10 times the appropriate level for the test, to the spacecraft. (A "G" is a unit of force equal to the gravity exerted on a body at rest.) As a result, the spacecraft's structure was damaged and three of the four solar arrays were severely damaged.

Mishap Board Chairman Denny Kross, manager of engineering systems at NASA's Marshall Space Flight Center, Huntsville, Ala., said a misalignment between two pieces of the test stand led to an abnormally high level of static friction (what engineers call "stiction"). The computer used to control the test then tried to compensate and induced too large a shock into the satellite.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. Call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the third Thursday of the month at noon in Building 167-111. Call Greg Hickey at ext. 4-0776.

Senior Caregivers Support Group—Meets the first Tuesday of each month in Building 167-111. For information, call the Employee Assistance Program at ext. 4-3680.

Friday, May 26

CISSR Speaker Series—Jack Jones, principal engineer in the Science and Technology Development Section 354, will demonstrate Mars solar-heated hot-air Montgolfiere balloons and a Mars inflatable "monster" rover at 1:30 p.m. in Building 157-102. Space is limited. If more than 30 people sign up, a second tour will be scheduled at a later date. RSVP to Ellie.Trevarthen@jpl.nasa.gov or call ext. 4-0147.

Von Kármán Lecture Series—Dr. John Trauger, principal investigator for the Wide Field and Planetary Camera 2, one of the Hubble Space Telescope's five premier science instruments, will discuss "The Hubble Space Telescope: Ten Years in Flight" at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Tuesday, May 30

CISSR Seminar Series—Dr. Mark Yim, senior member of the research staff at Xerox Palo Alto Research Center, will present the current state of the PolyBot project, which has demonstrated 10s of modules locomoting over rubble, steps, pipes, etc., as well as manipulating a variety of objects. This system has several potential space applications, including planetary exploration and space station maintenance. To be held at 10:30 a.m. in Building 306-400.

Thursday, June 1

JPL Gun Club—Meeting at noon in Building 183-328.

Sat., June 3—Sun., June 4

JPL Open House—The annual event will be open to the public from 9 a.m. to 5 p.m. both days. To avoid traffic congestion in the west lot, JPL personnel are encouraged to park in the east lot, where trams will be available for transportation to on-Lab locations. For information, call the Public Services Office at ext. 4-0112.



Tuesday, June 6

JPL Gamers Club—Meeting at noon in Building 301-169.

JPL Genealogy Club—Meeting at noon in Building 301-227.

Wednesday, June 7

Associated Retirees of JPL/Caltech Board—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Prostate Cancer Screening—The Cancer Detection Center will conduct screening for men 40 and over at Occupational Health Services, Building 310-202, at the corner of Surveyor and Explorer Road. A limited number of screenings will be scheduled from 8:30 a.m. to 12:30 p.m. and 12:45 p.m. to 3:15 p.m., and will be given on a first-call basis. The screening will consist of a questionnaire, digital rectal examination and a prostate specific antigen, followed up with a letter explaining the results. The cost is \$25, payable at the time of the screening. To schedule an appointment, call ext. 4-3320.

NASA bestows annual honor awards to JPLers

JPL employees, contractors and partners were recognized by NASA for their outstanding work over the past year as the Laboratory held the agency's annual Honor Awards ceremony May 16.

JPL Director Dr. Edward Stone, Deputy Director Larry Dumas and NASA Deputy Associate Administrator for Space Science Dr. Earle Huckins presented 92 awards to teams and individuals.

Following is a list of those receiving Honor Awards:

Public Service Group Achievement Award

Given to a group of nongovernment employees in recognition of an outstanding accomplishment that has

contributed substantially to the NASA mission.

Janis Research Company, FACET Cryostat Development Team, Lockheed Martin Astronautics Stardust Team.

Group Achievement Award

Given in recognition of an outstanding accomplishment that has been made through the coordination of many individual efforts and has contributed substantially to the accomplishment of the NASA mission. This award may be used to recognize the accomplishments of either a total government employee group or, as a team award, a group comprised of both government and nongovernment personnel.

Acquisition Strategic Partnering

Team, Atmospheric Laser Spectroscopy Group, Cassini Flight Team, Cross-Enterprise Technology Development Program Team, Deformable Flat Plate/Array Feed Compensation System Team, Exploration Technology Rover Task Team, Galileo Flight Team, ISO 9001 Implementation Team, Mark IV Interferometer Team, Mars Global Surveyor Science Teams, NASA/Air Force Research Laboratory Strategic Partnership Team, Palomar Adaptive Optics System Development Team, Quick Scatterometer Mission Team, Remote Agent Experiment Flight Team, Southern California Integrated GPS Network Team, Stardust Project Team, Team for the NASA/JPL Educator Resource Center and Applied

Technology Classroom, Pomona; 34-meter Array Implementation Team, TMOD Sequence Adaptation Team, 2MASS Team.

Exceptional Engineering Achievement Medal

Awarded for unusually significant engineering contributions toward achievement of the NASA mission. This award may be given for individual efforts or applications of engineering principles or methods that have resulted in a contribution of fundamental importance in this field or have significantly enhanced understanding of this field.

Richard Goldstein.

Continued on page 4



DOING THE RIGHT THING

Lab policies promote diversity, affirmative action in hiring and employment

By Mark Whalen

JPL'S DIVERSITY PROGRAM OFFICE is responsible for administering the Laboratory's equal opportunity and affirmative action programs, which are mandated under a federal executive order covering government contractors. Employees have asked about the role of this office and JPL's commitment to affirmative action. Ozell Grissom, the manager of the Diversity Program Office, and JPL Deputy Director Larry Dumas talk about these important issues with Universe.

Q What are the trends in the employment of women and minorities at JPL?

Dumas: Currently the Lab population is about 28 percent women and 26 percent ethnic minorities, and those percentages have increased overall since we first began keeping records in the 1960s. This trend reflects the increased availability of women and minorities in the workforce from which we draw our employees, as well as the effect of the Lab's affirmative action programs.

Q What is affirmative action and what are the Lab's affirmative action responsibilities?

Dumas: Various federal laws impose nondiscrimination and affirmative action obligations on federal contractors, such as the Lab. The Lab is legally obligated to not discriminate against employees or applicants because of race, color, religion, sex, national origin, disability and other protected categories; and to take affirmative action to ensure that applicants and employees are employed without regard to such factors.

We do this not just because of legal requirements, but because it's the right thing to do.

Q Who is responsible for ensuring that the Lab complies with these requirements?

Dumas: It is everyone's responsibility to ensure that discrimination does not occur in our workplace.

Ed Stone and I hold managers responsible for ensuring nondiscrimination and taking affirmative action. All the direct reports to the director and me have as part of their Employee Contribution and Planning (ECAP) performance evaluation how they're doing on diversity in their organizations. We expect that kind of performance evaluation to be carried out at all levels of management.

Grissom: We recommend that managers communicate to their organization the importance of affirmative action and that we must comply with it, the same as we are required to do in the areas of safety, health, security and other contractual requirements.

Q "Diversity" seems to go beyond affirmative action. What's that all about?

Grissom: As the Lab's manager of diversity, my major goals are to foster an inclusive environment where differences and similarities of individuals are valued and respected, so that the talents and capabilities of our diverse workforce are fully utilized. The Diversity Office works to create an environment where effective communication, cooperation and collaboration among all employees allow them to contribute productively to JPL's missions.

The Management Oversight Group for Affirmative Action (MOGAA), which is chaired by Larry Dumas and includes other Executive Council members, looks at the Lab's affirmative action efforts and tries to increase diversity awareness on Lab. A good example of our efforts to improve management's commitment to diversity is through discussion at section managers' and group supervisors' workshops.

Lab management can only do so much. Groups such as the Advisory Council for Women (ACW) and the Advisory Council for Minority Affairs (ACMA) also have helped. People are being informed about educational reimbursement programs, courses offered on Lab, and other things employees can take advantage of to make themselves more marketable for internal promotions.

Dumas: The input and assistance of these groups in the area of diversity has been very helpful to the director and me. These organiza-

tions have a longstanding record of accomplishment, and have helped the Executive Council and senior management to understand the needs and concerns of the women and minority communities at JPL. I would like to acknowledge and thank them for their assistance.

Equally important, I personally have found that the things that are helpful for women and minority employees are also helpful for everybody else here, and in that way these organizations have been helpful in improving the quality of life generally here at JPL.

Q What does JPL do to increase its diversity in recruitment efforts?

Grissom: For new hires, supervisors working in conjunction with human resources recruiters can ensure that job searches cover a wide variety of sources for qualified applicants. Frequently, managers are aware of specialty groups that the recruiter may not know about, but which would be a good source of candidates. The recruiter will ensure that these groups are included in recruitment efforts.

We also now have an automated resume scanning system, which automatically reviews resumes and provides recruiters with resumes that may meet a job's particular requirements. After an initial computer search, the recruiter reviews the resumes to ensure candidates meet job requirements. This process has helped us to identify qualified candidates who otherwise might not have come to our attention.

Dumas: But we don't just wait until a position is open. The Lab supports a variety of programs to increase representation of women and minorities in the engineering and science fields. We also maintain extensive college recruitment programs to identify well-qualified candidates available for positions that we fill from schools.

It's efforts such as these that have helped improve representation of minorities and women.

Q Does JPL use a quota system to hire or employ minorities?

Dumas: No. Federal regulations that govern JPL do not allow quotas. The only time you see quotas is when there are court-imposed sanctions against an employer.

Q What about the passage of Proposition 209 in California, which some believe has allowed organizations to stop recruiting minorities?

Grissom: Some people think that as a result of the passage of Prop 209, affirmative action died. But in fact, because we are governed by federal laws relating to affirmative action, Prop 209 has had no impact on our requirements or our activities.

Dumas: The Lab is committed to conducting all its activities in a way that does not discriminate. Our recruitment and selection efforts are geared to finding a diverse applicant pool and hiring and promoting the best-qualified candidates. We take our affirmative action efforts seriously and are committed to working towards a truly representative workforce.

Q How can interested employees get more information, or help out?

Dumas: They can speak with Ozell or Alicia Gary in his office, or with any of the members of ACW, ACMA, or the minority affinity groups sponsored by ACMA. The chairpersons of these groups are:

Tom May, ACMA; Pat Westerlund; ACW; James Black, African American Resource Team; Toby Solorzano, Amigos Unidos; and Regina Sakurai, Asian American Council.

Every division-level organization has an affirmative action representative, and they would also be a good source of information. Supervisors or managers are another source of information or names of persons to contact.

"The Lab is committed to conducting all its activities in a way that does not discriminate. Our recruitment and selection efforts are geared to finding a diverse applicant pool and hiring and promoting the best-qualified candidates."

— Larry Dumas,

JPL deputy director

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previous issues of
Universe online

<http://universe.jpl.nasa.gov>

Ad deadline extended

Due to the
Memorial Day holiday
on May 29, the
deadline for ads for the
June 9 issue of Universe
has been extended to
Tuesday, May 30 at 2 p.m.

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via e-mail to universe@jpl.nasa.gov.

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publication for the follow-
ing issue.

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AWARDS *continued from page 2*

Exceptional Scientific Achievement Medal
*Awarded for unusually significant scientific contri-
butions toward achievement of the NASA mission.
This award may be given for individual efforts that
have resulted in a contribution of fundamental im-
portance in this field or have significantly enhanced
understanding of this field.*
Joan Feynman.

Exceptional Service Medal
*Awarded for significant, sustained performance
characterized by unusual initiative or creative
ability that clearly demonstrates substantial im-
provements or contributions in engineering, aero-
nautics, space flight, administration, support, or
space-related endeavors that contribute to the
NASA mission.*

Phillip Barela, Gary Beaner, Richard Benson,
Martha Berg, Steve Chien, Richard Cofield IV,
Cynthia Cooper, R. Scott Dunbar, Linda Facto,
Thomas Fouser, Bruce Goldstein, Cecilia Guiar,
Curt Henry, William Heventhal III, Alan Hoffman,
Ulf Israelsson, Robert Jarnot, Jeremy Jones,

Charles Kaczinski, Sunjay Moorthy, Timothy Pham,
Herbert Pickett, Mary Reaves, David Rogstad,
Robert Ryan, John Smith Jr., Robert R. Smith, Julie
L. Webster, Aimee Whalen.

Exceptional Achievement Medal
*Awarded for significant, specific accomplishment or
contribution clearly characterized by a substantial
and significant improvement in operations, efficiency,
service, financial savings, science or technology that
contributes to the NASA mission.*

Arthur Amador, Ralph Basilio, Leo Bister, James
Bock, James Border, N. Talbot Brady, John Casani,
Moustafa Chahine, Artur Chmielewski, Steven
Collins, Z. Nagin Cox, Richard Dekany, William Curt
Eggemeyer, Daniel Eldred, Suzanne Frederick,
Taeha Goodrich, James Huddleston, Kent Kellogg,
Satish Khanna, P. Douglas Lisman, Earl Maize,
Anthony Martin, Virgilio Mireles, Alex Moncada,
Tracy Neilson, Stephen Proia, Stephen Prusha,
Laurence Reinhart, J. Edmund Riedel, John Slonski
Jr., Tony K.T. Tang, F.H. Jim Taylor, E. Eilene Theilig,
Wu-Yang Tsai, Glenn Tsuyuki, Barbara Wilson,
Carroll Winn.

Letters

I want to thank the wonderful people
in Division 180 for the deep concern,
especially the hugs. The plant from
ERC is lovely. They were all very much
appreciated when my grandmother
went to be with the Lord on April 28.
She left many beautiful memories that
will live on with my family and me.

Sherri Rowe-Lopez

Thank you to the ERC for the lovely
plant sent for the passing of my
father. And thanks to all of our friends
at JPL for the support and expres-
sions of sympathy.

Bob and Darlene Hall

Dear JPL friends and colleagues:
Thanks for your thoughtfulness and
support on the recent passing of my
mother. The ERC plant, your cards,
and charitable contributions to her
favorite organizations are appreciated.

Charles D. Norton

Passings

LARRY GOODMAN, 47, a security
officer in Section 665, died of natural
causes May 9 at his home in Pomona.

Goodman had worked at JPL for
eight years. He is survived by his wife,
Teresa, and sons Mario and Anthony.
Services and burial were held May
20 in Memphis, Tenn.

Classifieds

For Sale

AIR CONDITIONER, win. unit, Panasonic,
115V, 620W, 5000 BTU/hr., \$150/obo;
ENTERTAINMENT CTR, oak, Danish modern,
TV, VCR, knick-knack shelves w/glass drs., 5
lg. drawers., 2 match. pcs., 6'x36"x21" &
6'x30"x16", great cond., \$120/obo; DINING
RM CHAIRS, 3 ea., black lacquer, \$ 10 ea.
626/355-2157, Steve.

AIR CONDITIONERS, win. mount, Panasonic
CW-806TU, 7800 BTU '96, Consumer
Reports' best brand, \$250, Signature 5825,
5000 BTU '94, \$150. 626/795-4975.

BIKE, boys, 20", 5 spd. Shimano shifter,
offroad tires, exc. cond., \$49. 909/592-2279.
BIKE, road, Cannondale, 58cm alum. frame,
Shimano equipped, SPD compatible pedals,
exc. cond., \$500/obo. 349-1645, Janet or
Charles.

CAGE for rabbit, lg., wire frame, mounts on
wall or table top, gd. cond., \$10/obo.
909/981-7492, Jim or Darlene.

COFFEE & END TABLE, oak. 626/359-7666.
COPIER, prof., 50 copies/min., sorter,
document feeder, 1,000 sheet paper bin, 3
new cartridges, \$350. 626/969-4001.

CLAY POTS, lg., round, 2' & 3' dia., 2", \$50
ea/obo, 3', \$60 ea./obo. 626/791-6101.

COINS, '99-D Susan B Anthony dollars, \$2
ea. or tube of twenty coins, \$28, or '96 mint
sets, \$12. 626/332-2682, Steve.

COMPUTER, Mac PowerBook G3, 3-yr. ext.
warr., '99 Series, mod. MAC OS 9, 333MHz
processor, 192Mb RAM, 14" screen, 56kpbs
modem, Ultra SCSI, 100/10Mbps Ethernet, 2
USB ports, PCMCIA slot, line in audio, built-
in mic., VST USB floppy drive, Norton
AntiVirus 6.0 Utilities 5.0, MS Office 98, Vir-
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6 chairs, \$375; 42" round tinted glass, 4
chairs, \$200, or \$500 for both tables.
626/523-9229, Daryl.

DRESS, woman's, evening, stunning, black,

spaghetti straps, make ABS, brand new, sz.
2-4, pd. \$235, sell \$195. 241-8208 after 9
pm, Irene.

FLYING SAUCER, hand-built, 12 ft. dia., pvc &
tarp, good child's playhouse, \$50/obo. 352-
4885, Daniel.

HAMMER DRILL, B&D Prof. 1/2", set of
masonry bits, green, series. 3000 BPM,
reversible, variable spd., hammer on/off, gd.
cond., \$45; EXERCISE BIKE, stationary, older
style, speedometer & odometer, force adjust-
ment, handlebar/seat adj., \$15; GUITAR
STAND for acoustics, legs fold, gd. cond.,
\$10; IRONING BOARD metal, full sz., folds,
pad & cover, gd. cond., \$10. 352-0075.

MATTRESS SET, twin, Ortho, 4 mos. old;
bought new for \$140, sell \$70, firm. 626/798-
8626.

MISCELLANEOUS: tools, gardening equip., re-
frigerator, furn., antique stoves, 7-pc. French
antique bedrm. set, lots of odds-&-ends,
clothes, suitcase, antique mirror, ski clothes
& equip. sz. 7, black leather suit, coat, skirt,
jacket, shoes, toys, etc. 626/794-0455, Ollie.

MOVING SALE: furniture, oak roll-top desk,
walnut etagere, girl's French provincial
bedrm. set (desk, dresser, chest-of-drawers,
bed-side stand), solid-wood, cargo-type bunk
bed, bkcase., chest-of-drawers, Wurlitzer
ebony upright piano, lg. butcher-block oak
kitch. island, ready to install, stove, 2 self-
cleaning gas ovens, men's & women's
bicycles, much more. 626/446-2091,
eves/weekends.

OPERA TICKETS, Billy Budd, June 17
matinee, Dorothy Chandler Pavilion, Balcony
B, 2 seats, \$29 ea. 952-8455.

PALMORDER 8, Sony 24X, color, digital,
Steady Shot, 3 batt., \$299; Belkin 4 to 1
peripheral sharing device w/gold IEEE cable,
\$45, orig \$99; BATTERY, long lasting metal
hydride for Nokia 6000 series cell phone,
\$15; BATTERY, new, for Sony Mavica, \$30,
orig. \$65. 366-6134.

PETAL CAR, 1970s?, shaped like an Oscar
Mayer weiner-mobile, gd. wkg. cond., real
collectable, \$185. 248-5282.

PLAYHOUSE, outdoor, for toddlers, \$75.
626/355-9733, after 3 p.m.

POOL, Doughboy, 16' dia., great cond.,
ladder, pump, cover, acces., \$1,000/obo. 249-
9534.

RECLINER, dark green, med. sz., w/tiny strip-
ing exc. cond., take apart for storage/moving,
new cost appx. \$350, sell for \$100, can deliver
if needed. 246-3331.

REFRIGERATOR, top freezer, Amana, 20 cu.
ft., almond, exc. cond., \$200. 957-7905.

SOFA, 2 pc., has twin sleeper & recliner,
beige w/multi-colors, exc. cond., \$600/obo.
626/334-1535 after 6 p.m.

TABLE, work, folding, wall-mount, hollow-
door, 36"x80", hinged at 26"x54" in fold-up,
now bolted to wood wall mount, exc. cond.,
\$150/obo. 909/593-4046,
vivdavies@starquest.net.

TOY CAR, R.C. gas pwr., Traxxas, Nitro
Rustler, O'Donnell pipe, Dirthog tires, chrome
rim, recoil starter, radio, Pro-15 race eng.,
ready to run, exc. cond., 6 mos. old, \$249.
909/592-2279.

WASHER/DRYER combo, Kenmore heavy duty,
perfect for small spaces, \$600. 626/289-
7790, Nathan.

Vehicles / Accessories

'97 ACURA CL coupe, 2.2L, red w/black
leather int., 5 spd., sun/moonroof, CD, 76K
mi., \$13,500/obo. 253-6645.

'95 ACURA Legend LS coupe, 2 dr., black, au-
to, 105K mi. mostly fwy., mint cond., black
leather, sunroof, heated seats, alloy wheels,
CD changer, remote keyless entry,
\$16,000/obo. 626/584-3204 day, 626/791-
6101, eve/weekend.

'87 BMW 325i, auto, a/c, 4 dr., pwr. win./sun-
roof, 112K mi., \$4,000/obo. 626/396-9752.

'93 CHEVROLET Lumina APV van, green/gray,
V6 3.1L, auto, 7 bucket seats, 5 removable,
a/c, rear air, cc, am/fm/tape w/CD jack. pwr.
s/w/l, tilt wheel, ABS 4-wheel brakes, privacy
glass, exc. upholstery, VG cond., 93K mi.,
\$6,900. 909/981-7492, Jim or Darlene.

'90 DODGE van, custom, V8, a/c, 104K mi., 4
captains chairs, rear bench, \$5,900.
626/798-5835.

'81 FIAT Spider Pininfarina convertible, black
w/tan top, good body/eng./tires, perfect for
graduate, \$2,350. 323/225-1732.

'96 FORD Escort LX, exc. cond., 5 spd., 2 dr.,
57K mi., a/c, am/fm/cass., \$6,900/obo.
909/323-3640.

'96 FORD Explorer XLT, tan/leather int., auto,
pwr. s/w/dl, am/fm/cass., keyless remotel/
alarm, 70K mi., gd. cond., \$14,500. 591-9732.

HONDA stock stereo, digital am/fm receiver,

memory presets, cass. player, CD player com-
patible, \$15. 248-8103, Mike.

'97 JEEP Wrangler SE, red, 4WD, p/s/b, air
bags, Kenwood stereo w/cass., sound bar, Lo-
Jack, ignition cut-off, 31"x10.5" tires, alloy
rims, 25K mi., still under transf. warr., exc.
cond., \$13,500. 248-8103, Mike.

'92 MITSUBISHI Diamante, 4 dr., sedan, V6
3L, auto, air, pwr./s/w/l/ant./seats, alarm, cc,
temp. ctrl., 90K mi., \$6,500. 626/282-7022.

'99 TOYOTA Corolla LE, still has new car
smell, scant miles, orig. mfg. warr., loaded,
a/c, am/fm/cass. stereo, pwr. s/l/w, extra
value pkg. 626/463-1269 ext. 4019.

'94 TOYOTA Tercel DX, 4 dr., runs/looks
great, auto, air bag, a/c, stereo, new time
belt/breaks/fr. tires, great for commute,
\$5,200/obo. 310/990-9714.

'89 TOYOTA Camry, white, 96K mi., exc.
cond., a/c, auto, pwr./w/l/s, am/fm, cc.
626/579-7403.

'98 VOLVO S70 sedan 4 dr., white w/tan int.,
40K, a/c, p/s/w/d, cc, cass., ABS, dual air
bags, all records, very clean, \$19,950.
626/795-8340, Paul.

'86 VOLVO 240DL, 5-dr. station wagon, blue,
158K mi., auto, running cond., \$2,000/obo.
790-5965.

Wanted

CANOE, used, gd. cond., 2 or 3 person, very
stable. 626/791-7645.

SPACE INFORMATION/memorabilia from U.S.
& other countries, past & present. 790-8523,
Marc Rayman.

Free

AIR HOCKEY table, full sz., not pretty but
works, pucks & paddles, you haul, Valencia
area. 661/297-0219.

CAT, gorgeous black & white "tuxedo", 1-yr.-
old female, incredibly well-behaved, playful,
affectionate, wish we could keep her, spayed,
all shots, very clean & healthy. 248-2855,
Dave & Kelly.

RIVER ROCK, about 3 cu. yds., from 6" dia. to
over 12", free if you haul. 626/355-6573 eves.

Lost & Found

Found: BRACELET, gold, found near annex
parking lot 5/12. Ext. 4-0344.

Lost: SCULPTURE, unique, bronze talons ris-
ing out of a tin bucket of red sand, about 18"
tall, 15 lbs. 951-1257, Laura.

For Rent

ALTADENA, lg. furn. rm., cable TV, share 3
bd., 3 ba., quiet hilltop house, pool, patios,
view; c/a/h; all amenities, laundry, kitch., d/w;
priv. pkg. spot; 11 min./JPL; smoke OK, owner
smokes, \$500, incl. util. + dep., avail. 6/10.
626/794-1050, after 5 p.m., Harry.

ARCADIA furn. rm., cozy, Indry. & kitch. privi-
leges, pool, non-smoker, \$350. 626/448-
8809, Shary.

EAGLE ROCK furn. rm. in single fam. house,
nice area, 10 min. JPL, private entrance &
bath, share kitch. & Indry privileges, \$350, in-
cl. util. 323/256-1785.

GLENDALE apt., townhouse style, 2 stor y,
c/a, 2 bd., 2.5 ba., built-ins except d/w, 12
yrs. old, 1054 Thompson Ave, \$785, 1-yr.
lease. 240-1523, mgr.

LA CANADA sm. rm. w/private entrance &
ba., walk to work, temp. or commuter
special, \$400. 790-1893.

LA CANADA/FLINTRIDGE rms., kitch.
privileges, private bath., off-street pkg., pool,
BBQ, avail July 1. 790-1280.

SW PASADENA, mature lady seeks clean,
non-smoking roommate to share modern con-
do, female preferred, furn., twin bed, 2 night-
stands, dresser, desk, small refrig., microw.,
13" color TV, private ba., a/c, indoor Indry.,
secure pkg./bldg., pool, spa, Jacuzzi, exercise
& rec. rm., \$480 + 480 sec. dep., exc. phone &
cable, references req., avail. 6/5, view now.
626/793-3019.

PASADENA, roommate wanted to share 3-bd.,
3-ba. apt. w/Caltech post doc & student, fully
furn., laundry, 7 mi. JPL, \$475+ util.
626/351-9641.

PASADENA, near Caltech, lovely, spacious 3-
bd. home w/fenced yard, \$1,395. 790-1209.

SYLMAR, dream rent/buy option, 4 bd., 3 1/2
ba., 11 rms., 2,500 sq. ft., f/p, Jacuzzi in
master ba., 2 fam. rms., den w/outside
entrance, comm. pool, gated, 20 mi. from
JPL, view San Gabriel Mtns., \$2,190.
626/584-6526, Fred.

TEMPLE CITY house, 2 bd. + bonus rm.,
a/c, big backyd., 2 car gar., formal dining
rm., exc. location, \$1,300, \$1,500 dep.

Outstanding Leadership Medal

*Awarded for notably outstanding leadership that
has had a pronounced effect upon NASA technical
or administrative programs. The leadership award
may be given for an act of leadership or for sus-
tained contributions based on an individual's effec-
tiveness as a leader, the productivity of the
individual's program, or demonstrated ability to
develop the administrative or technical talents of
other employees.*
James Graf, David Halpern.

Distinguished Public Service Medal

*Awarded to any individual who is not an employee
of the federal government or was not an employee
of the government during the period in which the
service was performed. The award is granted only to
individuals whose distinguished accomplishments
contributed substantially to the NASA mission. The
contribution must be so extraordinary that other
forms of recognition by NASA would be inadequate.
This is the highest honor that NASA confers to a
nongovernment individual.*

Jacques Blamont [Centre National d'Etudes Spa-
tiales - CNES], John Reppy [Cornell University].

626/355-2030, Esther.

Real Estate

GLENDALE condo, small but charming 1 bd.,
near Glendale Comm. College, lovely
courtyard entrance, \$150,000. 956-1744,
Barbara.

LA CANADA-FLINTRIDGE view home, 4 bd.,
2.5 ba., c/a, 2,778 sq. ft., 2-car gar., lg. drive-
way, 15' swim spa, LC schools, very quiet
street & neighborhood, 53,954 sq. ft. on 2
lots, oak forest & creek, 2.5 mi. to JPL, see
www.realtor.com, "La Canada", "Ca", MLS
ID=G202353, \$849,500. 952-9654.

LA CANADA, 4 bd., 2 ba., LC schools, '96 re-
model, c/a, master suite with f/p & walk-in
closets, LR with f/p, updated kitch., laundry
rm., new paint, move-in ready, reduced to
\$409K. 952-2581.

LA CRESCENTA 4 bd., 4 ba., 2,150 sq. ft.
house, upstairs master suite, f/p, cent. a/c, 2-
car gar., lemon & plum trees, quiet nbhd, 5
mi/JPL, gd. nearby schools, \$425K, seek 7/19
closing. 957-3022 evenings; Web photos at
home.earthlink.net/~lyldar.

PASADENA bungalow home, near JPL/Caltech,
f/p, wood flr., nice kitch., lots storage, master
bd., full ba., Indry. rm., huge gar. w/working
shop area, huge backyd. fruit trees/flowers, al-
most 1/4 acre, must see to appreciate, as is,
\$175,000. 626/794-0455, Ollie or Bill.

SANTA CLARITA, 3 bd., 2 1/2 ba., tri-level,
1,850 sq. ft., easy fwy. access, gd.
neighborhd., completely modernized w/top of
line, covered patio, 2 car gar., 180-degree
view in back, room for pool or spa, must see
to appreciate, \$280,000. 661/254-3119.

VALENCIA house, by owner, very nice 3+2+
fam. rm., walk to great elem. & Jr. Hi.
schools, exc. neighborhd., fresh paint, new
roof c/a/h, f/p, in-ground spa, o/d BBQ,
converted gar. w/full ba., priced to sell,
\$198,000. enriquemedina@yahoo.com,
661/297-3933, home or 569-2017, pager.

Vacation Rentals

BIG BEAR LAKEFRONT, lux. townhome, 2
decks, tennis, pool/spa, near skiing, beach.
master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA ocean front house, sleeps up to 4,
exc. view. 248-8853.

HAWAII, Kona, on 166 ft. of ocean front on
Keauhou Bay, priv. house & guest house,
comfortably sleep 6, 3 bd., 2 ba., rustic,
relaxing & beaut., swim, snorkel, fish,
spectac. views, near restaur., golf courses,
other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, on beach
w/ocean vw., 25 ft. fr. surf, 1 bd. w/loft, com-
pl. furn., phone, color TV, VCR, microw., d/w,
pool, priv. lanai, slps. 4, 4/15-12/14 rate
\$100/nite/2, 12/15-4/14 rate \$115/nite/2,
\$10/nite add'l. person. 949/348-8047.

LAKE TAHOE, north shore, 2 bd., 2-1/2 ba.,
sleeps 6-7, private sandy beach, pool, great
loc., all amenities, hike/golf/fish, 2 mi. to
casinos, JPL disc. summer wkly rate, \$650.
626/355-3886, Rosemary or Ed.

MAMMOTH, Chamonix condo, 2 bd., 2 full
ba., sleeps 6, fully equip. elec. kitch.
w/microw. & extras, f/p & wood, color TV,
VCR, cable, FM stereo, pool & sun area, o/d
Jacuzzi, sauna, game, rec. & laundry rms,
play & BBQ areas, convenient to hiking,
shops, summer events, daily/weekly rates.
249-8524.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft,
sleeps 6-8, fully equip. kitch. incl. microw.,
d/w, cable TV, VCR, phone, balcony w/view to
mtns., Jacuzzi, sauna, streams, fishponds,
close to Mammoth Creek, JPL disc. 626/798-
9222 or 626/794-0455.

OCEANSIDE, on the sand, charming 1-bd.
condo, panoramic view, walk to pier & harbor,
pool/spa, game rm., sleeps 4. 949/786-6548.

PACIFIC GROVE house, 3 bd., 2 ba., f/p, cable
tv/vcr, stereo/CD, well-eqpd. kitch. w/microw.,
beaut. furn., close to golf, beaches., 17 Mile Dr,
Aquarium, Cannery Row, JPL disc. 626/441-
3265.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean
view, pool, tennis, short walk to beach on
priv. rd., 18-hole golf course 6 mi. away, priv.
secure parking. 626/794-3906